Simpson

INSTRUMENTS THAT STAY ACCURATE

OPERATOR'S MANUAL

STABRO LABORATORIES, INC.
TECHNICAL REFERENCE LIBRARY
DOCUMENT CONTROL ADMINISTRATOR

COLOR BAR GENERATOR

MODEL 430

SIMPSON ELECTRIC COMPANY
5200 W. Kinzie St., Chicago 44, Illinois, ES 9-1121
In Canada, Bach-Simpson, Ltd., London, Ontario

Simpson

INSTRUMENTS THAT STAY ACCURATE

OPERATOR'S MANUAL

COLOR BAR GENERATOR

MODEL 430

SIMPSON ELECTRIC COMPANY
5200 W. Kinzie St., Chicago 44, Illinois, ES 9-1121
In Canada, Bach-Simpson, Ltd., London, Ontario

Copyright 1958, Simpson Electric Co., Chicago, Illinois
ISSUE - JANUARY 1958

Printed in U.S.A.

FIGURE 1. THE SIMPSON COLOR BAR GENERATOR MODEL 430.

SPECIFICATIONS

Types of output: −Video, +Video, RF (with on-off 4.5 Mc marker), 15,750∿ sync pulse, and 3.58 Mc sine wave.

Modulation or video signals: Y, Chroma, Color (standard 100% NTSC pattern), I, Q, I/Q, R−Y, B−Y, R−Y/B−Y, G−Y/90°, Burst/sync.

Channels covered: Channels 2 through 6 on fundamentals and 7 through 13 on harmonics.

Color bar sequence: Red, Yellow, Green, Cyan, White, Magenta, Blue, Black.

Color chroma phase accuracy: ±5°.

Demodulator chroma phase accuracy: ±3° (from absolute).

Chroma and luminance amplitude accuracy: ±10%.

Attenuator range: Video, 0 - 3.5 volts peak to peak; RF, maximum output greater than 10,000 μvolts, channels 2 through 6 (control of attenuator 15 db).

Chroma attenuator switch positions: Fixed, 0db, −6db, −15db; Variable, −15db to +5db.

Power requirements: 117.5 volts, 50 or 60 cycles, approximately 100 watts.

Size: 11" wide by 14½" high by 16¼" deep.

Weight: Approximately 30½ lbs.

SECTION I

GENERAL DESCRIPTION

The Simpson Color Bar Generator Model 430 is a complete and efficient signal generator which is necessary for checking the operation of a color TV receiver. It will furnish known color patterns to the receiver for a check on its overall response characteristics and for checking its matrixing; it will check the chroma levels at the picture tube; it will check delay line operation in the receiver; and it will permit various other tests and adjustments.

The Simpson Color Bar Generator Model 430 furnishes outputs which are compatible with all existing demodulator systems. The three systems now in use are known as the I and Q system, the R-Y and B-Y system, and the R-Y and G-Y system. The Simpson Color Bar Generator has outputs which match the requirements for testing all these systems. It also furnishes a horizontal synchronizing signal with color burst, a Y (luminance) signal, a chroma signal (chroma only), and a color signal (chroma plus Y).

FIGURE 2. PICTURE TUBE PATTERN FOR COLOR OUTPUT.

When the Color Bar Generator is set for RF output, these signals modulate an RF carrier which is tunable from channels 2 through 6 (or, with harmonics, channels 7 through 13. This modulated RF can be coupled to the antenna terminals of the color TV receiver.

When the Color Bar Generator is set for VIDEO output, these signals are available without an RF cartrier and can be used for checking the color section of the receiver. The receiver manufacturer's instructions will specify either a negative or a positive polarity for the VIDEO signal, and both polarities are available from the Color Bar Generator Model 430.

Nine of the eleven positions of the FUNCTION switch on the front panel will deliver signals which should result in a color pattern on the picture tube of the receiver. For maximum convenience, each of these switch positions includes a color frame which shows the expected color. The frames are large e nough to permit easy comparison of the hue and saturation of the color pattern on the picture tube. The other two positions of the FUNCTION switch (Y and BURST SYNC.) deliver signals which can be used for analyzing luminance and synchronizing circuits.

The sequence of switch positions of the FUNCTION switch assists in a simple check of the delay line's operation.

An attenuator on the front panel controls the amplitude of the RF and VIDEO outputs from the Color Bar Generator.

A convenient two-position slide switch on the front panel provides a 4.5 MC marker for correct tuning between the Generator and the TV receiver.

A cable, furnished with the Color Bar Generator, connects from the RF jack to the receiver antenna terminals, or from the VIDEO jack to the input of the receiver color section. Two other jacks provide a 15750∿ horizontal synchronizing pulse and a 3.58

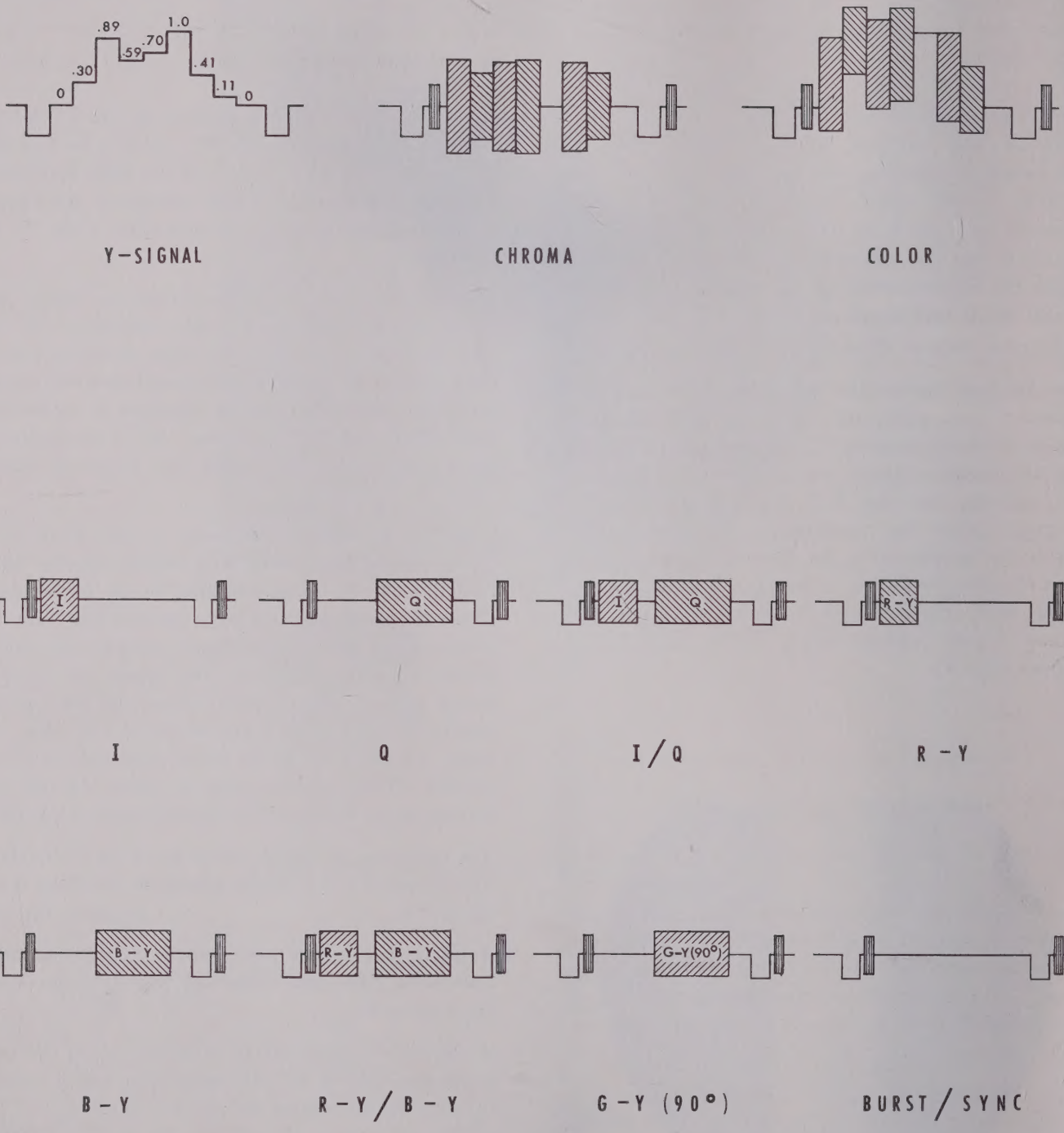


FIGURE 3. OUTPUTS AVAILABLE FROM THE SIMPSON COLOR BAR GENERATOR MODEL 430.

MC signal. An extra connector is supplied for constructing an additional cable to utilize these outputs.

The right side of the Generator case has a large hinged door for easy access to additional controls, tubes and other adjustments.

From the rear of the case, a group of screwdriver adjustments and a LINE VOLTAGE switch are accessible. The LINE VOLTAGE switch has two positions; set it at the position which corresponds to the power line voltage. This switch is factory set at the 110-125 V position. The screwdriver adjustments will be used if field adjustments are necessary.

POWER REQUIREMENTS

The Simpson Color Bar Generator Model 430 has been designed to operate on a power input of 117.5 volts 60 cycles AC, with the LINE VOLTAGE switch on the rear of the case set at 110-125 V. Power consumption is approximately 100 watts. The Generator will operate satisfactorily on any 60 cycle AC input from 100 to 110 volts when the LINE VOLTAGE switch is set at 100-110 V, or from 110 to 125 volts when the LINE VOLTAGE switch is set at 110-125 V. A constant line voltage during use is desirable for best results.

FRONT PANEL CONTROLS

FUNCTION SWITCH

This large 11-position switch at the top of the front panel selects the type of signal which is delivered from the Color Bar Generator (see figure 3). In the Y position, it will deliver a Y signal which is the luminance or monochrome portion of the composite color signal. This is sometimes referred to as the W signal. It will produce vertical bars with various shades of gray.

When the switch is set at CHROMA, the signal should produce a color bar pattern on the receiver picture tube (see figure 2). This pattern will not be bright, since the signal does not contain the Y component. The sequence of colors from left to right on the picture tube will be red, yellow, green, cyan, white, magenta, blue and black.

When the switch is set at COLOR, the signal should produce the same pattern as for the CHROMA position but with more brilliance. This output contains both chroma and Y (luminance) signals.

When the switch is set at I, the signal should produce a wide orange-looking bar on the left side of the picture tube.

When the switch is set at Q, the right side of the picture tube should show a purple-looking bar.

When the switch is set at I/Q, the signal should produce both the I and Q bars.

When the switch is set at R-Y, the signal should produce a reddish bar on the left side of the picture tube.

When the switch is set at B-Y, the signal should produce a blueish bar on the right side of the picture tube.

When the switch is set at (R-Y) (B-Y), the signal should produce both the R-Y and B-Y bars.

When the switch is set at G-Y/90°, the signal should produce a yellowish-orange bar on the right side of the picture tube.

When the Switch is set at BURST SYNC., no color will be seen on the picture tube; the signal contains the burst synchronizing signal and the horizontal synchronizing signal.

OUTPUT

This four-position rotary switch selects the type of signal output for the Generator. In its OFF position, the entire Generator is turned off. In each of the other three positions, the Generator power is turned on, as indicated by the pilot lamp. When the switch is set at −VIDEO or +VIDEO, the Generator output is available through the VIDEO jack at the bottom of the front panel. The type of signal is selected by the FUNCTION switch. As indicated, this signal is available in either polarity. When the switch is set at RF, the selected signal is modulated on a carrier frequency, and is available through the RF jack at the bottom on the front panel.

CHANNELS

This is a continuously variable control for tuning the RF carrier of the Generator to correspond with TV channels 2,3,4,5, or 6. The RF oscillator is rich in harmonics, and permits reception on channels 7 through 13.

ATTENUATOR

This continuously variable control permits adjustment on the signal strength of the Color Bar Generator on RF and VIDEO outputs.

4.5 MC

This two-position slide switch permits the mixing of a 4.5 megacycle signal into the RF output. When tuning the receiver and the Generator to the same frequency, set this switch at ON (up) and watch for an interference in the pattern on the picture tube. When the receiver and the Generator are properly tuned, the interference will be minimized or eliminated, and the switch may then be set at OFF (down).

CONTROLS INSIDE CASE

Average design standards for chroma sensitivity in color TV receivers require that the receiver shall produce a locked-in color pattern when the chroma level is reduced as much as 15 decibels. A convenient switch located inside the right side of the Color Bar Generator case permits a quick check of this condition in any receiver. The normal switch position is 0 db. When the switch is set at -6 db or at -15 db, the chroma level is reduced as indicated at the switch position. The -6 db position is used when checking the chroma section of receivers employing vestigial IF alignment. When the switch is set fully counterclockwise, the chroma level may be varied from approximately -15 db to +5 db with the OVERALL CHROMA GAIN control.

All of the other controls inside the right side of the case are to be used for maintenance of the Color Bar Generator. See the Maintenance section of this manual for further information.

CONTROLS AT REAR OF CASE

As mentioned in Power Requirements, page 5, there is a LINE VOLTAGE switch at the rear of the case. Set it at the position which corresponds to the available line voltage.

There are also five maintenance controls at the rear of the case. These are not to be adjusted except when required during maintenance. See the Maintenance section of this manual for further information.

ACCESSORIES

An output cable is furnished with the Simpson Color Bar Generator Model 430. The plug end will fit into all jacks on the front panel of the Generator. The other end of the cable has two clips for connecting the cable to the receiver under test.

When a horizontal synchronizing signal or a subcarrier signal is desired for oscilloscope synchronization or for any other purpose, a second cable can be constructed from the accessory connector provided. If desired, another output cable, Simpson part #10-830061, may be purchased for such use.

Many of the adjustments which may be made with the Simpson Color Bar Generator Model 430 will require no equipment other than the Generator and the color TV set. For other adjustments, a variety of test equipment may be required, but this will be the standard list of test equipment which is normally required for monochrome TV servicing, and it should be present in any service shop. Among the instruments which will be used are a wide band oscilloscope, such as the Simpson Model 458, and a Vacuum Tube Voltmeter, such as the Simpson Model 303 or 311.

A regulated power line voltage source is desirable for color TV servicing. Fluctuations in the power line voltage can cause variations in the operation of the Color Bar Generator as well as in the response characteristics of the receiver. If possible, set the regulated voltage for the Color Bar Generator at 117.5 volts.

PHYSICAL DESCRIPTION

The Simpson Color Bar Generator Model 430 is housed in a convenient metal case which measures 11 inches wide by 14½ inches high by 16¼ inches deep. A handle on the top of the case makes the instrument easy to carry for portable use. The Color Bar Generator weighs only 30½ pounds.

The front panel arrangement provides a functional arrangement of controls which are easy to use in a test bench setup. The indicator windows at the FUNCTION switch positions provide easy references to the relative colors which should be present on the picture tube when the receiver operates properly.

SECTION 2
OPERATION

APPLICATIONS

The Simpson Color Bar Generator Model 430 finds application in demodulator checking and alignment, matrix checking, check of delay line operation, check of chroma levels at the picture tube, overall chroma circuitry performance, check of burst and horizontal sync circuitry, check of luminance circuitry, check of overall receiver performance, hue and saturation adjustments, and check of overall RF-IF video detector circuitry.

For detailed application procedures, refer to the receiver manufacturer's service manual. The Model 430 will provide all the necessary outputs needed for color TV servicing.

POWER LINE CONNECTIONS

Connect the power plug of the Simpson Color Bar Generator Model 430 into any convenient source of 60 cycle AC voltage from 100 to 125 volts. Best results will be obtained if the power source is regulated at 117.5 volts. The Generator power requirements are approximately 100 watts.

Set the LINE VOLTAGE switch, located near the power line cord input on the rear of the case, at the position which corresponds to power line voltage. If the voltage is between 100 and 110 volts, set the switch at 100-110V. If the voltage is between 110 and 125 volts, set the switch at 110-125V.

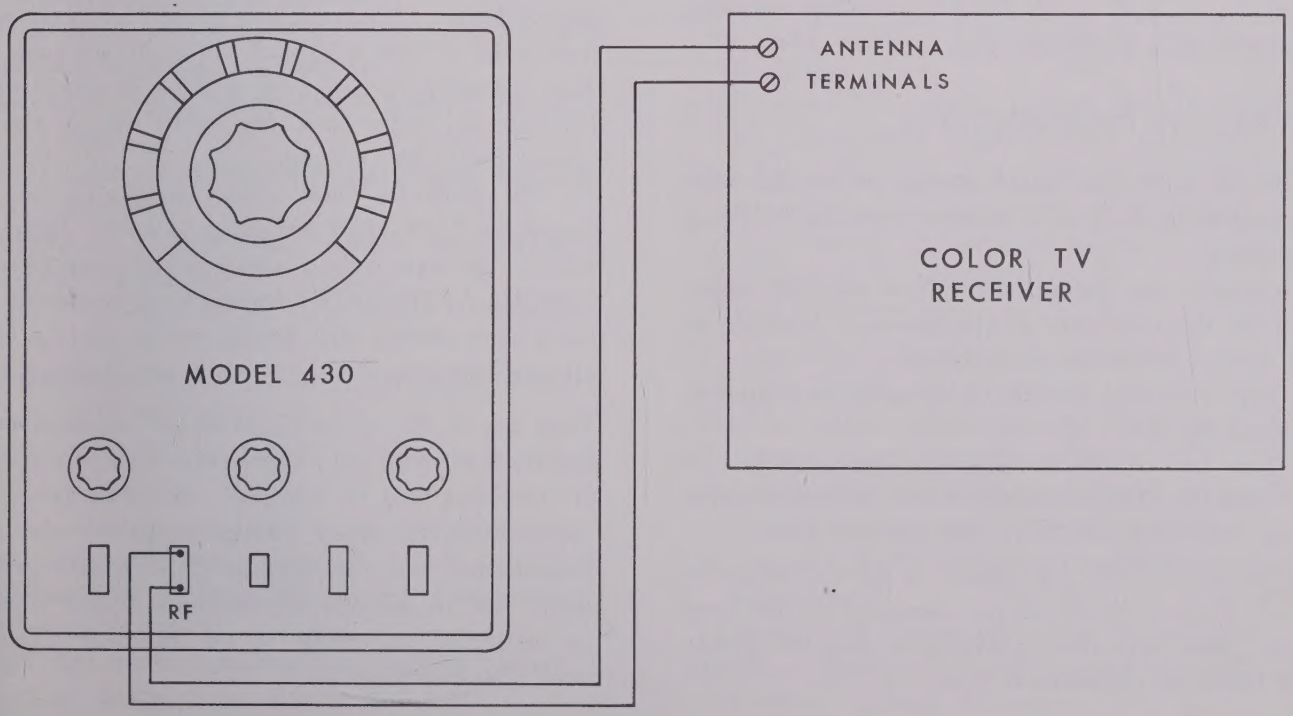


FIGURE 4. CONNECTING THE COLOR BAR GENERATOR TO THE TV RECEIVER.

Set the OUTPUT switch on the front panel of the Generator at -VIDEO, +VIDEO, or RF as desired. This will turn on power for the Generator, and the pilot lamp, located above the OUTPUT switch, should glow to indicate that power is on. If it does not, check the fuse. If the fuse is blown, replace it with another 2 ampere type 3AG fuse. NEVER USE A FUSE WITH A HIGHER RATING. If a second fuse blows, this indicates trouble in the Generator, and it should be repaired as required before the fuse is again replaced.

Leave the Generator turned on for a warm-up period of 15 to 20 minutes for maximum stability of of operation.

CONNECTING GENERATOR TO TV RECEIVER

The connection from the Generator to the TV receiver will vary according to the type of testing and servicing which is to be performed. Figure 4 shows the connections for an overall check, in which the RF output from the Color Bar Generator will be connected to the antenna terminals of the receiver. This will be the most common connection, and will be used for presetting the hue and saturation controls of the receiver, as well as checking the overall response characteristics of the receiver.

OVERALL TV RECEIVER CHECK

To determine the best settings for the hue and saturation controls of a receiver, use the following procedure:

1. Connect the output cable from the RF output jack on the Generator to the antenna terminals of the TV set as shown in Figure 4.
2. Turn on power for the TV receiver and allow it to warm up.
3. Turn the OUTPUT switch of the Generator to RF. Set the ATTENUATOR control maximum clockwise. Set the FUNCTION switch at COLOR.
4. Set the CHANNELS control of the Generator for a TV channel which is not received in the local area. Best operation is available with the Generator tuned for channels 4, 5, or 6.
5. Set the 4.5 MC switch on the Generator at ON (up).
6. Tune the TV receiver to the same channel as is selected by the Generator. Tune the receiver's fine tuning control until the interference from the 4.5 megacycle signal is at minimum or disappears; this occurs when the signal is absorbed in the receiver sound trap(s). Tuning is complete. Set the 4.5 MC switch at OFF.
7. Observe the picture tube of the receiver. It should have the following bars of color, from left to right; red, yellow, green, cyan, white, magenta, blue, and black. These are shown in the frame next to the COLOR position of the FUNCTION switch.
8. Adjust the brightness, contrast, hue and saturation controls of the receiver to obtain the best set of color bars.
9. Turn the Generator FUNCTION switch to CHROMA. The same color bars should appear on the picture tube, but they will not be as bright as in the COLOR position.
10. To check for proper delay line operation, observe the position of each edge of any color bar on the receiver picture tube as the Generator FUNCTION switch is turned back and forth between Y, CHROMA, and COLOR. The positions should not vary more than 3/16-inch on a 21-inch color picture tube. If more variation is noted, or if there is any overlap between any color bars, the delay line of the receiver should be checked.
11. To check for burst sync. sensitivity, set the Generator FUNCTION switch at COLOR. Open the door on the right side of the Generator and turn the CHROMA ATTENUATOR switch to -6 db and -15 db. Color bars should still appear on the picture tube, although the colors will become faded in appearance.

When any of the above steps do not produce satisfactory results on the picture tube of the TV receiver, servicing will be required. Always refer to the receiver manufacturer's service manual for servicing procedures. Use the Simpson Color Bar Generator Model 430 to produce all required signal sources for servicing according to the receiver manufacturer's instructions.

SECTION III

MAINTENANCE

All sealed potentiometer, inductor and capacitor adjustments are pre-set at the factory and should not be readjusted except when maintenance is required. These adjustments will produce a 100% saturated NTSC standard color bar signal as shown in figure 7.

The following adjustments are available through the large access door on the right side of the Color Bar Generator:

3579.545 K.C. ADJUST. Varies the effective capacity across the crystal and provides a fine frequency adjustment for the crystal oscillator, V10.

RED "Y" GAIN. Varies gain of red Y amplifier, V12 triode.

RED BAR SATURATION. Varies gain of gated chroma amplifier, V12 pentode.

I, OR R-Y SATURATION. Varies gain of gated chroma amplifier, V12 pentode.

BLUE BAR SATURATION. Varies gain of gated chroma amplifier, V14 pentode.

GREEN BAR SATURATION. Varies gain of gated chroma amplifier, V13 pentode.

GREEN "Y" GAIN. Varies gain of green Y amplifier, V13 triode.

BURST GAIN. Varies gain of gated burst amplifier, V11 pentode.

CHROMA ATTENUATOR. Switch varies gain of overall chroma amplifier, V16.

BLUE "Y" GAIN. Varies gain of blue Y amplifier, V14 triode.

4.5 M.C. MARKER. Varies output strength of 4.5 megacycle oscillator, V19.

OVERALL CHROMA GAIN. Varies gain of overall chroma amplifier, V16.

15750 C.P.S. Varies frequency of horizontal blocking oscillator, V1. Adjusted to lock with 78.75 Kc crystal oscillator V2 output, or a frequency division of 5 to 1.

OVERALL "Y" GAIN. Varies gain of overall Y amplifier, V16.

H. SYNC PULSE GAIN. Varies gain of horizontal synchronizing pulse amplifier, V17.

The following adjustments are available at the rear of the case:

BLUE BAR WIDTH. Varies output pulse width of the blue bar multivibrator, V7.

GREEN BAR WIDTH. Varies output pulse width of the green bar multivibrator, V6.

RED BAR WIDTH. Varies output pulse width of the red bar multivibrator, V5.

BURST WIDTH. Varies output pulse width of burst multivibrator, V4.

HOR. SYNC. WIDTH. Varies output pulse width of horizontal synchronizing pulse multivibrator, V3.

Q, B-Y, OR G-Y/90° SATURATION. Varies gain of gated chroma amplifier, V14 pentode.

All of the tubes in the Simpson Color Bar Generator Model 430 are available through the large access door on the right side of the case. The tubes, beginning in the upper left corner on the chassis, and their circuit functions are:

V10 Type 12AU7. 3.58 megacycle oscillator and amplifier.

V12 Type 6U8. Triode section, Red Y Amplifier. Pentode section, Gated Chroma Amplifier.

V13 Type 6U8. Triode section, Green Y Amplifier. Pentode section, Gated Chroma Amplifier.

V6 Type 12AT7. Green multivibrator.

V7 Type 12AT7. Blue multivibrator.

V5 Type 12AT7. Red multivibrator.

V8 Type 6BJ7. Trigger pulse shapers.

V9 Type 12AX7. Pulse mixer.

V11 Type 6U8. Triode section, clamping. Pentode section, Gated Burst Amplifier.

V14 Type 6U8. Triode section, Blue Y Amplifier. Pentode section, Gated Chroma Amplifier.

V3 Type 12AT7. Horizontal synchronizing pulse multivibrator.

V4 Type 12AT7, Burst gate pulse multivibrator.

V2 Type 12AT7. 78.75 KC crystal oscillator and 15750 ∿ cathode follower.

V19 Type 12AV7. RF Carrier oscillator and 4.5 megacycle oscillator.

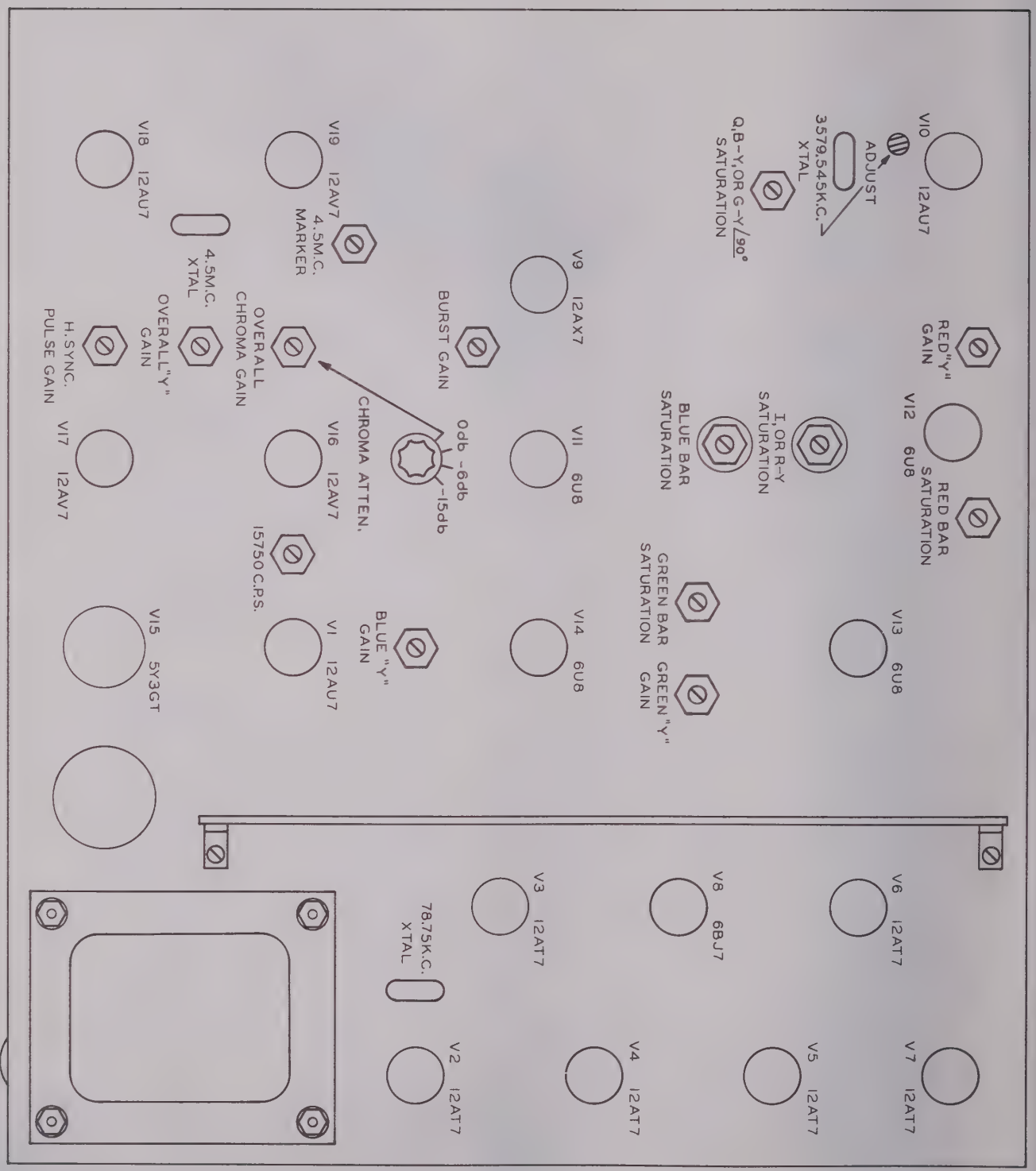


FIGURE 5. LOCATION OF TUBES, CONTROLS AND ADJUSTMENTS ON RIGHT SIDE OF CHASSIS.

V16 Type 12AV7. Overall Y Amplifier and Overall Chroma Amplifier.
V1 Type 12AU7. 15750 ∿ blocking oscillator, phase inverter.
V18 Type 12AU7. Modulator.
V17 Type 12AV7. Horizontal synchronizing pulse amplifier and phase splitter.
V15 Type 5Y3GT. Rectifier, power supply.

There are three crystals, located in plug-in sockets, which are also available through the large access door on the right side of the case:
3579.545 K.C. XTAL. Crystal control for the color sub-carrier oscillator. This is called 3.58 MC at the front panel.
4.5 M.C. XTAL. Crystal control for the 4.5 megacycle oscillator.
78.75 K.C. XTAL. Crystal control for the 78.75 KC Crystal Oscillator.

FIELD MAINTENANCE

The Simpson Color Bar Generator is designed to permit minor field touch-up adjustments, if necessary, to maintain the best operating condition at all times and to produce signals which satisfy NTSC (National Television Standards Committee) Standards. Besides the Color Bar Generator, a color television receiver in good operating condition and a wide band oscilloscope with a low-capacity probe are required. The oscilloscope frequency response must be flat from a low frequency to over 3.6 megacycles. The Simpson Colorscope Model 458 with the Simpson Model 741 Probe is excellent for this application.

ALIGNMENT CHECK

Connect the Color Bar Generator VIDEO output to the vertical input of the oscilloscope. Set the OUTPUT switch of the Color Bar Generator at −VIDEO and the FUNCTION switch at COLOR. Set the ATTENUATOR maximum clockwise. Set the 4.5 MC switch at OFF (down).

Adjust the oscilloscope sweep rate to view at least one complete wave form. Compare the waveform with figure 6. The NTSC tolerance on amplitudes in this waveform is ±20%. The Simpson Color Bar Generator should produce amplitudes which are within ±10% of those shown in figure 6.

Examine the following points in the waveform:
1. The burst peak-to-peak amplitude should be the same as the sync pulse peak-to-peak amplitude.
2. The lower peaks of the green bar should be about equal to the blanking level.
3. The upper peaks of the yellow and cyan bars should be about equal.
4. The lower peaks of the red and blue bars should be about equal.
5. The white bar should be free of sub-carrier modulation.
6. The upper peaks of the magenta bar should be about equal to the level of the white bar.

Touch-up is recommended if these portions do not match within ±10%.

TOUCH-UP PROCEDURE

Turn the Color Bar Generator on and allow it to warm up for 15 to 20 minutes. Set the controls as follows:

OUTPUT switch at −VIDEO
FUNCTION switch at COLOR.
4.5 MC switch at OFF (down).
ATTENUATOR at maximum clockwise position.

Connect the VIDEO output to the vertical input of the oscilloscope. Adjust the sweep frequency on the oscilloscope for two complete waveforms on the trace. Adjust the vertical gain as required to obtain a satisfactory waveform size.

The width adjustments are available at the rear of the case. Observe the oscilloscope waveform and set the HOR. SYNC. WIDTH and BURST WIDTH controls as follows:

Adjust the HOR. SYNC. WIDTH control at mid-rotation.

Adjust the BURST WIDTH control about 1/20 of the duration of a complete waveform. This will result in a burst width of 8 to 11 complete cycles of the sub-carrier.

ADJUST COLOR BAR WIDTHS

To make width adjustments of the color bars, connect the Color Bar Generator to a color TV receiver. Set the Generator controls as follows:

OUTPUT switch at RF.
FUNCTION switch at COLOR.
4.5 MC switch at ON (up).
ATTENUATOR switch at maximum clockwise position.
CHANNELS control for a TV channel which is not received in the local area.

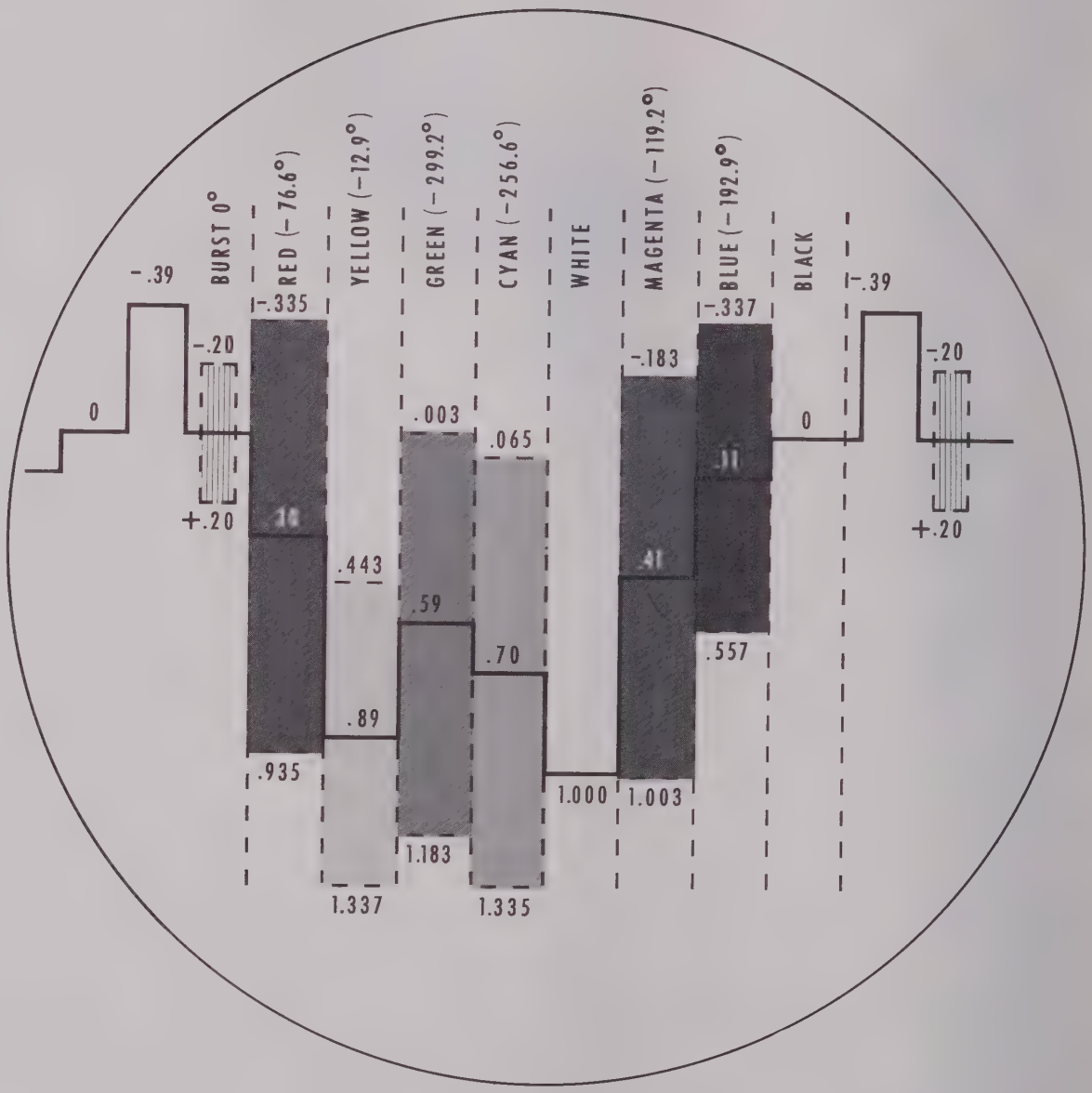


FIGURE 6. VIDEO OUTPUT WAVEFORM FOR COLOR OUTPUT.

Connect the RF output of the Generator to the antenna terminals of the TV receiver. Tune the receiver for the same channel as was selected with the Generator CHANNELS control. Rotate the fine tuning control of the receiver to minimize or eliminate interference from the 4.5 megacycle signal. Then set the 4.5 switch of the Generator at OFF (down).

When color bar widths are adjusted, only three primary colors are varied. These are red, green, and blue. The intermediate colors are made by mixing primary colors. Red and green signals overlap to produce yellow; green and blue signals overlap to produce cyan; all three primary colors overlap to produce white; and red and blue signals overlap to produce magenta. Where no chroma or Y is present, the receiver picture tube should appear black. This is shown in figure 2. The waveform of figure 6 includes all of this mixing action. When adjusting bar widths, the leading edge of each primary color will remain fixed, and the trailing edges will vary. Note that the trailing edge for red will be at the right of the yellow bar and at the right of the magenta bar. The trailing edge of the green will be at the right of the white bar. The trailing edge of the blue will be at the right of the blue bar. Adjust the RED BAR WIDTH, the GREEN BAR WIDTH, and THE BLUE BAR WIDTH controls in that order to produce the desired equal vertical bars of color on the picture tube.

Y-AMPLIFIER ALIGNMENT

As indicated in figure 6, the Y component (solid line) which is added to each primary color varies with the color. The amount of Y, or luminance, signal is shown by the level of the horizontal line through each bar. Considering the blanking level of the black as zero and the level of white as 100% for relative Y levels, the level of the green Y bar should be 59%, the red Y bar should be 30% and the blue Y bar 11%. Since the Y components add for the secondary colors, adjustment of the three primary color Y levels will satisfy requirements for the entire waveform.

Set the Color Bar Generator controls as follows:
OUTPUT switch at +VIDEO.
FUNCTION switch at Y.
4.5 MC switch at OFF (down).
ATTENUATOR at maximum clockwise position.

Connect the VIDEO output from the Generator to the vertical input of the oscilloscope. Adjust the sweep frequency of the oscilloscope to view at least one complete waveform. Adjust the vertical and horizontal gains as required to obtain a satisfactory waveform size.

Compare the waveform with the solid lines in figure 6. Note the ratio of levels between the red Y, green Y and blue bars. The red Y bar should be about half as far from the blanking level as the green Y, and the blue Y bar should be only about one-third as far from the blanking level as the red Y. If adjustments are necessary, use the following procedure:

1. Use a graticule over the face of the oscilloscope cathode ray tube to permit comparative vertical measurements to be made.
2. Adjust the oscilloscope vertical gain controls for satisfactory waveform size without overloading.
3. Adjust the GREEN "Y" GAIN control (inside the door at the right of the Generator case) to just below the point of overshoot.
4. Repeat step 3 with the RED and BLUE "Y" GAIN controls.
5. Adjust the scope vertical gain control to get 59 units of deflection between the blanking level and the green Y bar.
6. Adjust the RED "Y" GAIN control (inside the door at the right of the Generator case) to get 30 units of deflection between the blanking level and the red Y bar.
7. Adjust the BLUE "Y" GAIN control (inside the door) to get 11 units of deflection between the blanking level and the blue Y bar.
8. Recheck all three Y bar levels for the primary colors; touch-up each gain control as required to obtain the desired levels.
9. Adjust the OVERALL "Y" GAIN control (inside the door) for a blanking-level-to-white-level amplitude of 2.4 volts peak-to-peak.
10. Adjust the HORIZONTAL SYNC. PULSE GAIN control (inside the door) for a sync-tip-to-white amplitude of 3.5 volts peak-to-peak.
11. After making any changes in the settings of the "Y" GAIN controls, check and readjust the Chroma levels.

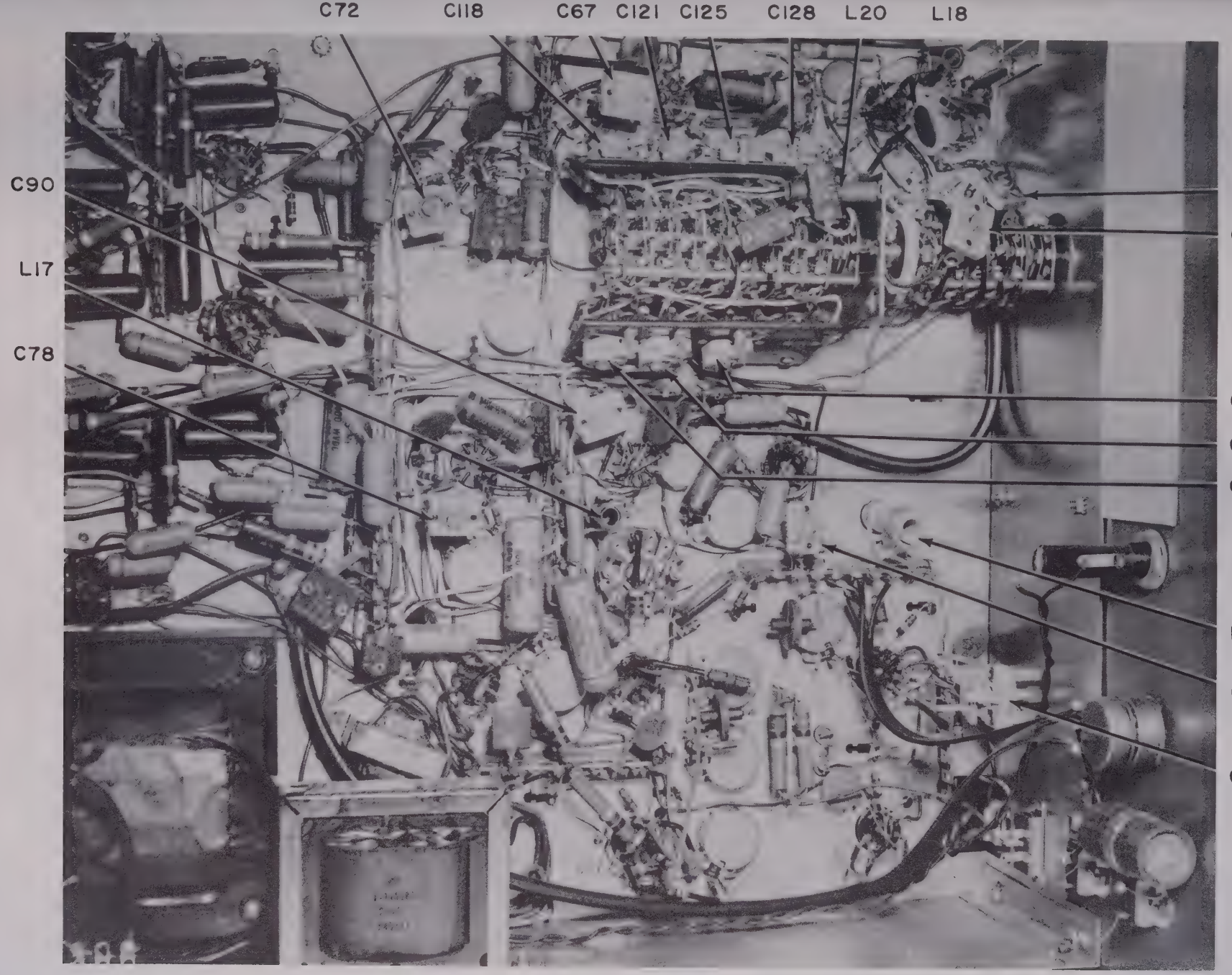


FIGURE 7. BOTTOM VIEW OF CHASSIS SHOWING LOCATION OF PARTS.

CHROMA LEVEL ADJUSTMENT

The addition of chroma appears as modulation in the waveform of figure 6. The ratio of modulation strength for each of the primary colors is adjusted with SATURATION controls inside the door at the right of the case.

Set the FUNCTION switch of the Generator at COLOR. Otherwise, use the same connections and control settings as for aligning the Y amplifiers. With the levels of the Y bars properly adjusted, the addition of modulation should fill out the complete waveform as shown in figure 6.

Adjust the GREEN BAR SATURATION control so the top level of the modulation on the green bar is level with blanking in the waveform. Then adjust the RED BAR SATURATION and the BLUE BAR SATURATION controls to completely eliminate modulation on the white bar in the waveform. There is some interaction between the three SATURATION controls, so repeat their adjustments until the green bar modulation is correctly set and the white bar is free from modulation.

OPERATIONAL CHECK

As a final alignment check, connect the Color Bar Generator to a color TV receiver in good operating condition and observe the color bars which are produced. Connect the output cable from the Generator to the antenna terminals of the receiver. Set the OUTPUT switch at RF and the CHANNELS control for a channel which is not in use in the locality. Set the 4.5 MC switch at ON and the FUNCTION switch at COLOR.

Tune the receiver to the same channel as was selected with the Generator CHANNELS control. Use the receiver fine tuning control to tune for an interference-free pattern on the picture tube.

Observe the color bar pattern on the receiver picture tube. The edges of the bars should be in good alignment, the colors should match those shown in the frame next to the COLOR position of the FUNCTION switch, and the white bar should be free from all chroma.

REPLACEMENT OF PARTS

Whenever maintenance is required on the Simpson Color Bar Generator Model 430 which includes replacement of any parts, use the proper equivalent for each part which is to be replaced. For convenience, the parts list and schematic diagram is included with these instructions. Use them together with figure 7 to locate and identify replaceable parts in the Generator. To order any part from Simpson Electric Company indicate that the part is to be used in a Color Bar Generator Model 430, its Reference Symbol, Description and Simpson Part Number; this will give assurance that a proper replacement part will be furnished.

For major overhaul or alignment, or for any other maintenance which cannot be performed satisfactorily, return the Generator to the nearest official Simpson Repair Station or to the repair department at the Factory. Always accompany any such shipment with a letter, explaining what is wrong with the equipment and whether an estimate is required before repairs proceed. Such a letter will save both time and handling costs.

PARTS LIST

Reference Symbol	Description	Simpson Part No.
C1	Not used	
C2	Capacitor, fixed, silver mica, flat, 2200 mmf	1-116557
C3	Capacitor, fixed, silver mica, flat, 2200 mmf	1-116557
C4	Capacitor, fixed, silver mica, flat, 2200 mmf	1-116557
C5	Capacitor, fixed, silver mica, flat, 2200 mmf	1-116557
C6	Capacitor, fixed, silver mica, flat, 2200 mmf	1-116557
C7	Capacitor, fixed, silver mica, flat, 2200 mmf	1-116557
C8	Capacitor, fixed, silver mica, flat, 2200 mmf	1-116557
C9	Capacitor, fixed, silver mica, flat, 2200 mmf	1-116557
C10	Capacitor, fixed, silver mica, flat, 2200 mmf	1-116557
C11	Capacitor, fixed, silver mica, flat, 2200 mmf	1-116557
C12	Capacitor, fixed, silver mica, flat, 2200 mmf	1-116557
C13	Capacitor, fixed, silver mica, flat, 2200 mmf	1-116557
C14	Capacitor, fixed, silver mica, flat, 2200 mmf	1-116557
C15	Capacitor, fixed, silver mica, flat, 2200 mmf	1-116557
C16	Capacitor, fixed, silver mica, flat, 2200 mmf	1-116557
C17	Capacitor, fixed, silver mica, flat, 1000 mmf	1-116556
C18	Capacitor, fixed, silver mica, flat, 470 mmf	1-116555
C19	Capacitor, fixed, silver mica, flat, 270 mmf	1-116904
C20	Capacitor, fixed, paper, tubular, .05 mf	1-113899
C21	Capacitor, fixed, silver mica, flat, 220 mmf	1-116554
C22	Capacitor, fixed, paper, tubular, .1 mf	1-113901
C23	Capacitor, fixed, paper, tubular, .01 mf	1-113896
C24	Capacitor, fixed, silver mica, flat, 47 mmf	1-116552
C25	Capacitor, fixed, ceramic, disc, 5000 mmf	1-116559
C26	Capacitor, fixed, paper, tubular, .01 mf	1-113896
C27	Capacitor, fixed, paper, tubular, .5 mf	1-114398
C28	Capacitor, fixed, paper, tubular, .01 mf	1-113896
C29	Capacitor, fixed, paper, tubular, .01 mf	1-113896
C30	Capacitor, fixed, paper, tubular, .01 mf	1-113896
C31	Capacitor, fixed, paper, tubular, .1 mf	1-113901
C32	Capacitor, fixed, paper, tubular, .01 mf	1-113896
C33	Capacitor, fixed, ceramic, disc, 5000 mmf	1-116559
C34	Capacitor, fixed, silver mica, flat, 100 mmf	1-114691
C35	Capacitor, fixed, paper, tubular, .01 mf	1-113896
C36	Capacitor, fixed, paper, tubular, .1 mf	1-113901
C37	Capacitor, fixed, paper, tubular, .1 mf	1-113901
C38	Capacitor, fixed, paper, tubular, .022 mf	1-116905
C39	Capacitor, fixed, silver mica, flat, 1000 mmf	1-116556
C40	Capacitor, fixed, paper, tubular, .1 mf	1-113901
C41	Capacitor, fixed, paper, tubular, .01 mf	1-113896
C42	Capacitor, fixed, paper, tubular, .1 mf	1-113901
C43	Capacitor, fixed, silver mica, flat, 200 mmf	1-114694
C44	Capacitor, fixed, paper, tubular, .01 mf	1-113896
C45	Capacitor, fixed, paper, tubular, .1 mf	1-113901
C46	Capacitor, fixed, paper, tubular, .1 mf	1-113901
C47	Capacitor, fixed, paper, tubular, .022 mf	1-116905
C48	Capacitor, fixed, silver mica, flat, 27 mmf	1-116571
C49	Capacitor, trimmer, mica ceramic, 4-30 mmf	1-116901
C50	Capacitor, fixed, paper, tubular, .01 mf	1-113896
C51	Capacitor, fixed, paper, tubular, .01 mf	1-113896
C52	Capacitor, fixed, ceramic, disc, 5000 mmf +100% -0% 1000 WVDC	1-116559
C53	Capacitor, fixed, ceramic, disc, 3000 mmf	1-116906
C54	Not used	
C55	Capacitor, trimmer, ceramic, 7-35 mmf	1-116902
C56	Capacitor, fixed, silver mica, flat, 78 mmf	1-116890
C57	Capacitor, fixed, ceramic, disc, 5000 mmf	1-116559
C58	Capacitor, fixed, ceramic, disc, 5000 mmf	1-116559
C59	Capacitor, trimmer, mica ceramic, 4-30 mmf	1-116901
C60	Capacitor, trimmer, mica ceramic, 4-30 mmf	1-116901
C61	Capacitor, fixed, paper, tubular, .5 mf	1-114398
C62	Capacitor, fixed, paper, tubular, .5 mf	1-117181
C63	Capacitor, fixed, ceramic, disc, 5000 mmf	1-116559
C64	Capacitor, fixed, paper, tubular, .5 mf	1-117181
C65	Capacitor, fixed, ceramic, disc, 5000 mmf	1-116559
C66	Capacitor, fixed, paper tubular, .05 mf	1-113899
C67	Capacitor, trimmer, mica/ceramic, 2-12 mmf	1-116900
C68	Capacitor, fixed, silver mica, flat, 470 mmf	1-116555
C69	Capacitor, fixed, paper, tubular, .5 mf	1-117181
C70	Capacitor, fixed, ceramic, disc, 5000 mmf	1-116559
C71	Capacitor, fixed, paper, tubular, .05 mf	1-113899
C72	Capacitor, trimmer, mica/ceramic, 2-12 mmf	1-116900
C73	Capacitor, fixed, silver mica, flat, 470 mmf	1-116555
C74	Capacitor, fixed, ceramic, disc, .01 mf	1-115385
C75	Capacitor, fixed, paper, tubular, .5 mf	1-117181
C76	Capacitor, fixed, ceramic, disc, 5000 mmf	1-116559
C77	Capacitor, fixed, paper, tubular, .05 mf	1-113899
C78	Capacitor, trimmer, mica-ceramic, 2-12 mmf	1-116900
C79	Capacitor, fixed, silver mica, flat, 470 mmf	1-116555
C80	Capacitor, fixed, ceramic, disc, 5000 mmf	1-116559
C81	Capacitor, fixed, ceramic, disc, 5000 mmf	1-116559
C82	Capacitor, fixed, electrolytic, can type 20-30-30 mf	1-116569
C83	Capacitor, fixed, silver mica, flat, 150 mmf	1-114693
C84	Capacitor, fixed, silver mica, flat, 150 mmf	1-114693
C85	Capacitor, fixed, paper, tubular, .5 mf	1-114398
C86	Capacitor, fixed, ceramic, disc, 5000 mmf	1-116559
C87	Capacitor, fixed, ceramic, disc, .01 mf	1-115385
C88	Capacitor, fixed, paper, tubular, .1 mf	1-114400
C89	Capacitor, fixed, silver mica, 220 mmf	1-116554
C90	Capacitor, trimmer, mica ceramic, 4-30 mmf	1-116901
C91	Capacitor, fixed, ceramic, disc, 5000 mmf	1-116559
C92	Capacitor, fixed, ceramic, tubular, 5 mmf	1-116227
C93	Capacitor, fixed, ceramic, disc, .01 mf	1-115385
C94	Capacitor, fixed, ceramic, disc, 5000 mmf	1-116559
C95	Capacitor, fixed, ceramic, tubular, 91 mmf	1-116892
C96	Capacitor, fixed, ceramic, disc, 5000 mmf	1-116559
C97	Capacitor, variable, air, 3.3 to 19.4 mmf	1-116567
C98	Capacitor, fixed, electrolytic, tubular, with bracket, 8 mf	1-116898
C99	Capacitor, fixed, ceramic, tubular, 15 mmf	1-115464
C100	Capacitor, fixed, ceramic, disc, 5000 mmf	1-116559
C101	Capacitor, fixed, ceramic, disc, 5000 mmf	1-116559
C102	Capacitor, fixed, ceramic, tubular, 100 mmf	1-113912
C103	Capacitor, fixed, ceramic, tubular, 100 mmf	1-113912
C104	Capacitor, fixed, silver mica, flat, 47 mmf	1-116552
C105	Capacitor, fixed, silver mica, flat, 100 mmf	1-116846
C106	Capacitor, trimmer, steatite, 7-45 mmf	1-116568
C107	Capacitor, fixed, silver mica, flat, 68 mmf	1-116553
C108	Capacitor, fixed, silver mica, flat, 100 mmf	1-116846
C109	Capacitor, fixed, silver mica, flat, 100 mmf	1-116846
C110	Capacitor, trimmer, steatite, 7-45 mmf	1-116568
C111	Capacitor, fixed, silver mica, flat, 100 mmf	1-116846

PARTS LIST

Reference Symbol	Description	Simpson Part No.
C112	Capacitor, fixed, silver mica, flat, 100 mmf	1-116846
C113	Capacitor, fixed, silver mica, flat, 100 mmf	1-116846
C114	Capacitor, trimmer, steatite, 7-45 mmf	1-116568
C115	Not used	
C116	Capacitor, fixed, silver mica, flat, 68 mmf	1-116553
C117	Capacitor, fixed, silver mica, flat, 150 mmf	1-116845
C118	Capacitor, trimmer, steatite, 7-45 mmf	1-116568
C119	Capacitor, fixed, silver mica, flat, 150 mmf	1-116845
C120	Capacitor, fixed, silver mica, flat, 27 mmf	1-116974
C121	Capacitor, trimmer, steatite, 7-45 mmf	1-116568
C122	Capacitor, fixed, silver mica, 68 mmf	1-116553
C123	Capacitor, fixed, silver mica, 150 mmf	1-116845
C124	Capacitor, fixed, silver mica, flat, 100 mmf	1-116846
C125	Capacitor, trimmer, steatite, 7-45 mmf	1-116568
C126	Capacitor, fixed, silver mica, flat, 150 mmf	1-116845
C127	Capacitor, fixed, silver mica, flat, 27 mmf	1-116974
C128	Capacitor, trimmer, steatite, 7-45 mmf	1-116568
C129	Capacitor, fixed, silver mica, flat, 220 mmf	1-116554
C130	Capacitor, fixed, ceramic, tubular, 10 mmf	1-115465
C131	Capacitor, fixed, ceramic tubular, .1mf	1-114400
CR-1	Germanium diode, IN 87 G	1-115970
L1	Not used	
L2	Coil, RF, molded core, fixed, 2.2 mh ±2%	1-116659
L3	Coil, RF, molded core, fixed, 2.2 mh ±2%	1-116659
L4	Coil, RF, molded core, fixed, 2.2 mh ±2%	1-116659
L5	Coil, RF, molded core, fixed, 2.2 mh ±2%	1-116659
L6	Coil, RF, molded core, fixed, 2.2 mh ±2%	1-116659
L7	Coil, RF, molded core, fixed, 2.2 mh ±2%	1-116659
L8	Coil, RF, molded core, fixed, 2.2 mh ±2%	1-116659
L9	Coil, RF, molded core, fixed, 2.2 mh ±2%	1-116659
L10	Coil, RF, molded core, fixed, 2.2 mh ±2%	1-116659
L11	Coil, RF, molded core, fixed, 2.2 mh ±2%	1-116659
L12	Coil, RF, molded core, fixed, 2.2 mh ±2%	1-116659
L13	Coil, RF, molded core, fixed, 2.2 mh ±2%	1-116659
L14	Coil, RF, molded core, fixed, 2.2 mh ±2%	1-116659
L15	Coil, RF, molded core, fixed, 2.2 mh ±2%	1-116659
L16	Coil, RF, molded core, fixed, 2.2 mh ±2%	1-116659
L17	Coil, RF, iron core adjustable, 30 to 60 uh	1-116658
L18	Coil, RF, iron core, adjustable, 12.5 - 25 uh	1-116903
L19	Choke, filter, 10.5 h	1-116581
L20	Coil, RF, iron core, adjustable, 4 to 10 uh (3.58 MC, G-Y/90° delay line)	1-116848
L21	Coil, RF, molded core, fixed 2.2 mh ±2%	1-116659
L22	Coil, overall chroma plate, 10 uh	1-116657
L23	Coil, RF (3.58 MC delay line) phenolic core, fixed, 7.5 uh ±2%	1-116656
L24	Coil, RF oscillator	1-116847
L25	Coil, RF (3.58 MC delay line) phenolic core, fixed, 7.5 uh ±2%	1-116656
L26	Coil, RF (3.58 MC delay line) phenolic core, fixed, 7.5 uh ±2%	1-116656
L27	Coil, RF (3.58 MC delay line) phenolic core, fixed, 7.5 uh ±2%	1-116656
L28	Coil, RF (3.58 MC delay line) phenolic core, fixed, 7.5 uh ±2%	1-116656
L29	Coil, RF (3.58 MC delay line) phenolic core, fixed 7.5 uh ±2%	1-116656
L30	Coil, 3.58 MC delay line, phenolic core, fixed, 7.5 uh ±2%	1-116656
L31	Coil, 3.58 MC delay line, phenolic core, fixed, 7.5 uh ±2%	1-116656
L32	Coil, 3.58 MC delay line, phenolic core, fixed, 7.5 uh ±2%	1-116656
L33	Coil, 3.58 MC delay line, phenolic core, fixed, 7.5 uh ±2%	1-116656
L34	Coil, 3.58 MC delay line, phenolic core, fixed, 7.5 uh ±2%	1-116656
L35	Coil, 3.58 MC delay line, phenolic core, fixed, 7.5 uh ±2%	1-116656
L36	Coil, 3.58 MC delay line, phenolic core, fixed, 7.5 uh ±2%	1-116656
L37	Coil, 3.58 MC delay line, phenolic core, fixed, 7.5 uh ±2%	1-116656
L38	Coil, RF (3.58 MC delay line) phenolic core, fixed, 7.5 uh ±2%	1-116656
L39	Coil, RF (3.58 MC delay line) phenolic core, fixed, 7.5 uh ±2%	1-116656
L40	Coil, RF, iron core, adjustable, 1.8 - 3.2 uh (3.58 MC, G-Y / 90° delay line)	1-116848
L41	Coil, RF, iron core, adjustable, 12.5 - 25 uh	1-116903
L42	Coil, RF, molded core, fixed 2.2 mh ±2%	1-116659
R1	Resistor, 820 ohm ±10%, ½ watt	1-114679
R2	Resistor, 27K ±10%, ½ watt	1-113944
R3	Potentiometer, 100K ±30%, linear taper	1-116566
R4	Resistor, 22K ±10%, 2 watt	1-115956
R5	Resistor, 470K ±10%, ½ watt	1-114227
R6	Resistor, 820K ±10%, ½ watt	1-116563
R7	Resistor, 100K ±10%, ½ watt	1-113949
R8	Resistor, 15K ±10%, ½ watt	1-111678
R9	Resistor, 1K ±10%, ½ watt	1-111689
R10	Resistor, 100K ±10%, ½ watt	1-113949
R11	Resistor, 100K ±10%, ½ watt	1-113949
R12	Resistor, 10K ±10%, ½ watt	1-111671
R13	Resistor, 4.7K ±10%, 2 watt	1-116698
R14	Resistor, 1.5K ±10%, ½ watt	1-114681
R15	Resistor, 1.2K ±10%, ½ watt	1-114680
R16	Potentiometer, 100K ±30%, linear taper	1-116566
R17	Resistor, 15K ±10%, 2 watt	1-116576
R18	Resistor, 100K ±10%, ½ watt	1-113949
R19	Resistor, 10K ±10%, 2 watt	1-113957
R20	Resistor, 10K ±10%, ½ watt	1-111671
R21	Resistor, 4.7K ±10%, 2 watt	1-116698
R22	Resistor, 1.5K ±10%, ½ watt	1-114581
R23	Resistor, 1.2K ±10%, ½ watt	1-114680
R24	Potentiometer, 100K ±30%	1-116566
R25	Resistor, 56K ±10%, ½ watt	1-113947
R26	Resistor, 100K ±10%, ½ watt	1-113949
R27	Resistor, 10K ±10%, 2 watt	1-113957
R28	Resistor, 15K ±10%, ½ watt	1-111678
R29	Resistor, 4.7K ±10%, 2 watt	1-116698
R30	Resistor, 330 ohms ±10%, ½ watt	1-115960
R31	Potentiometer, 100K ±30%	1-116566
R32	Resistor, 1.2K ±10%, ½ watt	1-114681
R33	Resistor, 82K ±10%, ½ watt	1-113948
R34	Resistor, 15K ±10%, ½ watt	1-111678
R35	Resistor, 100K ±10%, ½ watt	1-113949
R36	Resistor, 10K ±10%, 2 watt	1-113957
R37	Resistor, 15K ±10%, ½ watt	1-111678
R38	Resistor, 4.7K ±10%, 2 watt	1-116698
R39	Resistor, 470 ohm ±10%, ½ watt	1-113940
R40	Resistor, 1.2K ±10%, ½ watt	1-114680
R41	Potentiometer, 100K ±30%	1-116566
R42	Resistor, 220K ±10%, ½ watt	1-114226
R43	Resistor, 100K ±10%, ½ watt	1-113949
R44	Resistor, 10K ±10%, 2 watt	1-113957
R45	Resistor, 15K ±10%, ½ watt	1-111678

PARTS LIST

Reference Symbol	Description	Simpson Part No.
R46	Resistor, 4.7K ±10%, 2 watt	1-116698
R47	Resistor, 330 ohm ±10%, ½ watt	1-115960
R48	Resistor, 1.2K ±10%, ½ watt	1-114680
R49	Potentiometer, 100K ±30%	1-116566
R50	Resistor, 82K ±10%, ½ watt	1-113948
R51	Resistor, 100K ±10%, ½ watt	1-113949
R52	Resistor, 82K ±10%, ½ watt	1-113948
R53	Resistor, 27K ±10%, ½ watt	1-113944
R54	Resistor, 1K ±10%, ½ watt	1-111689
R55	Resistor, 100K ±10%, ½ watt	1-113949
R56	Resistor, 470K ±10%, ½ watt	1-114227
R57	Resistor, 680K ±10%, ½ watt	1-116562
R58	Resistor, 15K ±10%, ½ watt	1-111678
R59	Resistor, 560 ohm ±10%, ½ watt	1-116899
R60	Resistor, 6.8K ±10%, 2 watt	1-116575
R61	Resistor, 100K ±10%, ½ watt	1-113949
R62	Resistor, 220K ±10%, ½ watt	1-114226
R63	Resistor, 6.8K ±10%, ½ watt	1-113048
R64	Resistor, 470K ±10%, ½ watt	1-114227
R65	Resistor, 100 ohm ±10%, ½ watt	1-111940
R66	Resistor, 56K ±10%, ½ watt	1-113947
R67	Potentiometer, 10K ±30%	1-116565
R68	Resistor, 82K ±10%, ½ watt	1-113948
R69	Resistor, 56K ±10%, ½ watt	1-113947
R70	Resistor, 470K ±, ½ watt	1-114227
R71	Potentiometer, 10K ±30%	1-116565
R72	Resistor, 220K ±10%, ½ watt	1-114226
R73	Resistor, 820K ±10%, ½ watt	1-116563
R74	Resistor, 10K ±10%, ½ watt	1-111671
R75	Resistor, 56K ±10%, ½ watt	1-113947
R76	Resistor, 470K ±10%, ½ watt	1-114227
R77	Potentiometer, 10K ±30%	1-116565
R78	Potentiometer, 10K ±30%	1-116565
R79	Resistor, 220K ±10%, ½ watt	1-114226
R80	Resistor, 470K ±10%, ½ watt	1-114227
R81	Resistor, 10K ±10%, ½ watt	1-111671
R82	Resistor, 56K ±10%, ½ watt	1-113947
R83	Resistor, 470K ±10%, ½ watt	1-114227
R84	Potentiometer, 10K ±30%	1-116565
R85	Resistor, 220K ±10%, ½ watt	1-114226
R86	Resistor, 1 megohm ±10%, ½ watt	1-113952
R87	Resistor, 10K ±10%, ½ watt	1-111671
R88	Resistor, 180 ohm ±10%, ½ watt	1-115387
R89	Resistor, 150 ohms ±10%, ½ watt	1-113926
R90	Resistor, 220 ohms ±10%, ½ watt	1-115612
R91	Resistor, 47K ±10%, 2 watt	1-116577
R92	Resistor, 1.5K ±10%, ½ watt	1-114681
R93	Resistor, 3.3K ±10%, 2 watt	1-116573
R94	Resistor, 220K ±10%, ½ watt	1-114226
R95	Resistor, 47 ohm ±10%, ½ watt	1-113921
R96	Potentiometer, 1K ±30%	1-116564
R97	Resistor, 3.3K ±10%, 2 watt	1-116573
R98	Resistor, 15K ±10%, ½ watt	1-111678
R99	Resistor, 47 ohm ±10%, ½ watt	1-113921
R100	Resistor, 300 ohms ±5%, ½ watt	1-116982
R101	Potentiometer, 10K ±30%	1-116565
R102	Resistor, 820 ohms ±5%, ½ watt	1-116983
R103	Resistor, 56K ±10%, ½ watt	1-113947
R104	Resistor, 3.9K ohms ±5%, ½ watt	1-116984
R105	Resistor, 820K ±10%, ½ watt	1-116563
R106	Resistor, 82K ±10%, ½ watt	1-113948
R107	Resistor, 47 ohm ±10%, ½ watt	1-113921
R108	Potentiometer, 10K ±30%	1-116565
R109	Resistor, 1K ±10%, 2 watt	1-116572
R110	Resistor, 1K ±10%, 2 watt	1-116572
R111	Resistor, 1.0 Meg. ±10%, ½ watt	1-113952
R112	Resistor, 100K ±10%, ½ watt	1-113949
R113	Resistor, 100K ±10%, ½ watt	1-113949
R114(A)	Potentiometer, dual, 1K ±30% panel section,	1-116893
R114(B)	500 ohms ±30% rear section carbon, ½ watt, linear taper	
R115	Resistor, 1.5K ±10%, ½ watt	1-114681
R116	Potentiometer, 500 ohms ±30%	1-116701
R117	Resistor, 15K ±10%, ½ watt	1-111678
R118	Resistor, 680K ±10%, ½ watt	1-116562
R119	Resistor, 820K ±10%, ½ watt	1-116563
R120	Resistor, 470 ohm ±10%, ½ watt	1-113940
R121	Resistor, 330 ohms ±10%, ½ watt	1-115960
R122	Resistor, 220 ohms ±10%, ½ watt	1-115612
R123	Resistor, 220 ohms ±10%, ½ watt	1-115612
R124	Potentiometer, 10K ±30%	1-116565
R125	Potentiometer, 10K ±30%	1-116565
R126	Potentiometer, 10K ± 30%	1-116565
R127	Potentiometer, 10K ±30%	1-116565
S1	Switch, Rotary 2 sections, 4 position	1-116687
S2(A-E)	Switch, rotary, 5 section, 11 position	1-116685
S2(F-N)	Switch, rotary, 9 section, 11 position	1-116686
S3	Switch, rotary, 1 gang, 2 poles, 4 position	1-116895
S4	Switch, slide, SPDT, 1 amp	1-111690
S5	Switch, slide, SPDT, 3 amp	1-116684
T1	Transformer, blocking, oscillator	1-116849
T2	Transformer, Power	10-890324
V1	Tube electron, type 12AU7	1-114083
V2	Tube electron, type 12AT7	1-115466
V3	Tube electron, type 12AT7	1-115466
V4	Tube electron, type 12AT7	1-115466
V5	Tube electron, type 12AT7	1-115466
V6	Tube electron, type 12AT7	1-115466
V7	Tube electron, type 12AT7	1-115466
V8	Tube electron, type 6BJ7	1-116667
V9	Tube electron, type 12AX7	1-116669
V10	Tube electron, type 12AU7	1-114083
V11	Tube electron, type 6U8	1-116670
V12	Tube electron, type 6U8	1-116670
V13	Tube electron, type 6U8	1-116670
V14	Tube electron, type 6U8	1-116670
V15	Tube electron, type 5Y3GT	1-114671
V16	Tube electron, type 12AV7	1-116668
V17	Tube electron, type 12AV7	1-116668
V18	Tube electron, type 12 AU7	1-114083
V19	Tube electron, type 12AV7	1-116668

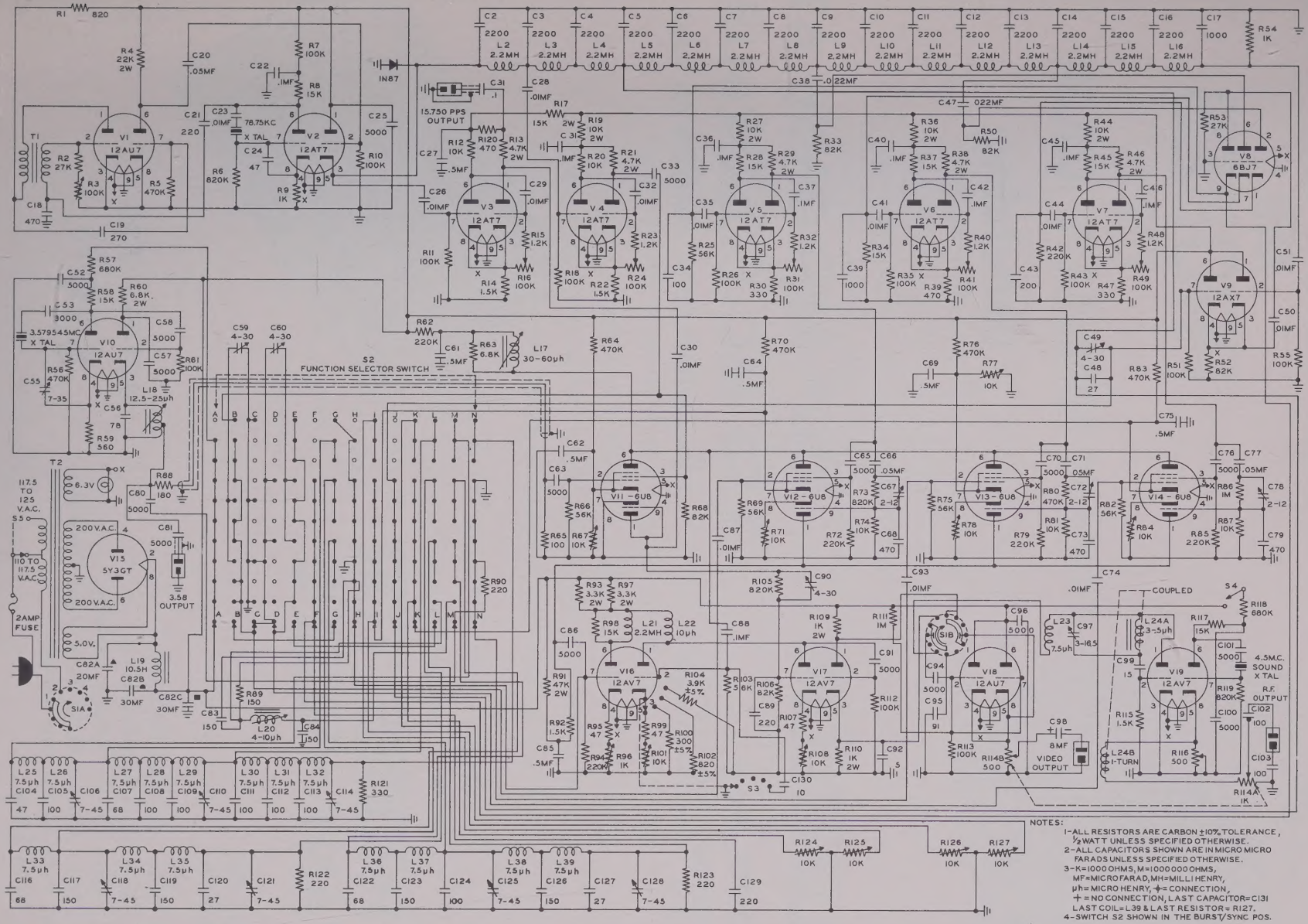
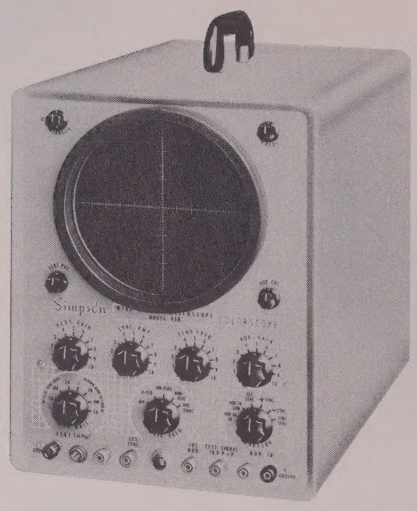

S2
FUNCTION SELECTOR SWITCH
15,750 PPS OUTPUT
S1A
S1B
S3
S4
COUPLED
2AMP FUSE
110 TO 117.5 V.A.C.
117.5 TO 125 V.A.C.
3.58 OUTPUT
4.5M.C. SOUND X TAL
R.F. OUTPUT
VIDEO OUTPUT
NOTES:
1-ALL RESISTORS ARE CARBON ±10% TOLERANCE, ½WATT UNLESS SPECIFIED OTHERWISE.
2-ALL CAPACITORS SHOWN ARE IN MICRO MICRO FARADS UNLESS SPECIFIED OTHERWISE.
3-K=1000 OHMS, M=1000000 OHMS, MF=MICRO FARAD, MH=MILLI HENRY, μh=MICRO HENRY, +=CONNECTION, +=NO CONNECTION, LAST CAP.=C131 LAST COIL=L39 & LAST RESISTOR=R127.
4-SWITCH S2 SHOWN IN THE BURST/SYNC POS.

FIGURE 8. OVERALL SCHEMATIC DIAGRAM.



OSCILLOSCOPE AND PROBES FOR COMPLETE COLOR servicing

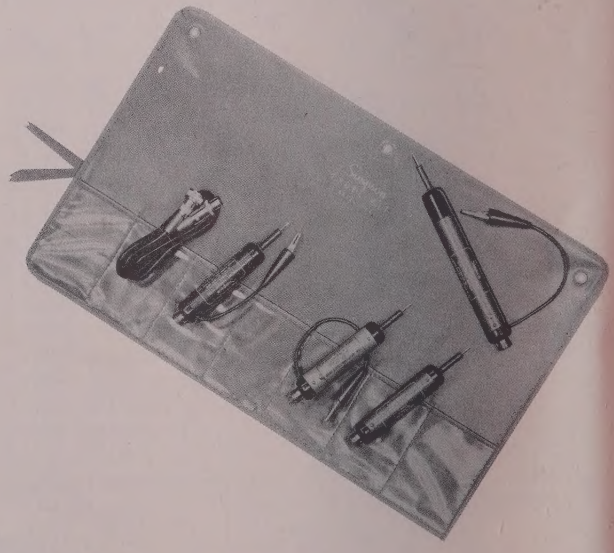
COLORSCOPE

MODEL 458

$229.95 complete with shielded input cable and manual

100% RESPONSE AT 3.58 MC COLORBURST

DUAL BANDWIDTH--NARROW OR WIDE



PROBES FOR ANY 'SCOPE

MODEL 739
INCLUDES:

Model 740A Voltage Doubler
Model 741A Low Capacitance
Model 742A 100:1 Voltage Divider
Model 743A Direct-Resistive Dual Purpose
Adaptor Plug to Fit Any 'Scope
Handy Vinyl Case

MODEL 739

$39.95

WARRANTY

SIMPSON ELECTRIC COMPANY warrants each instrument and other articles of equipment manufactured by it to be free from defects in material and workmanship under normal use and service, its obligation under this warranty being limited to making good at its factory any instrument or other article of equipment which shall within 90 days after delivery of such instrument or other article of equipment to the original purchaser be returned intact to it, or to one of its authorized service stations, with transportation charges prepaid, and which its examination shall disclose to its satisfaction to have been thus defective; this warranty being expressly in lieu of all other warranties expressed or implied and of all other obligations or liabilities on its part, and SIMPSON ELECTRIC COMPANY neither assumes nor authorizes any other persons to assume for it any other liability in connection with the sale of its products.

This warranty shall not apply to any instrument or other article of equipment which shall have been repaired or altered outside the SIMPSON ELECTRIC COMPANY factory or authorized service stations, nor which has been subject to misuse, negligence or accident, incorrect wiring by others, or installation or use not in accord with instructions furnished by the manufacturer.